UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,592	01/21/2004	Ian Humphrey	NGC-162/000388-280	4284

32205 7590 04/27/2007 CARMEN B. PATTI & ASSOCIATES, LLC ONE NORTH LASALLE STREET 44TH FLOOR CHICAGO, IL 60602	**EXAMINER** TURNER, SAMUEL A

ART UNIT	PAPER NUMBER
2877	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

Office Action Summary	Application No.	Applicant(s)
	10/761,592	HUMPHREY, IAN
	Examiner	Art Unit	
	Samuel A. Turner	2877	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _12 February 2007_.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-12,14 and 15_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-12,14 and 15_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _12 February 2007_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Drawings

The drawing correction received on 12 February 2007 is accepted by the

Examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102
that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or
a foreign country or in public use or on sale in this country, more than one year
prior to the date of application for patent in the United States.

Claims 1-12, 14, and 15 are rejected under 35 U.S.C. § 102(b) as being clearly

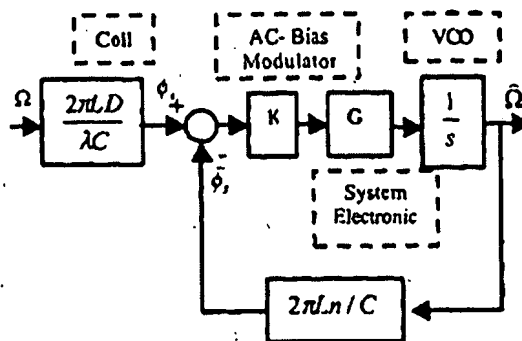anticipated by Noureldin et al(IEEE-1999).

Figure 2. The FOG as a closed loop

With regard to claim 1, Noureldin et al teach a process(fig. 2), comprising the

step of:

computing, via digital signal processing(page 633, abstract), one or more

performance parameters of a fiber optic gyroscope(page 635, section 3) to determine

a relationship between a performance parameter and a physical parameter

associated with fiber optic gyroscope components through employment of a closed-

loop transfer function(figure 2, equation 5) based on at least one characteristic of:

one or more optical components of the fiber optic gyroscope(page 633, section

2); and

one or more electrical components of the fiber optic gyroscope(page 633,

section 2).

As to claim 2/1, wherein the step of computing, via digital signal processing,

the one or more performance parameters of the fiber optic gyroscope to determine a

relationship between a performance parameter and a physical parameter associated

with fiber optic gyroscope components through employment of the closed-loop

transfer function based on the at least one characteristic of the one or more optical

components of the fiber optic gyroscope and the one or more electrical components of

the fiber optic gyroscope comprises the step of:

computing one or more performance parameters of the fiber optic

gyroscope(page 635, section 3) through employment of one or more physical

parameters of at least one of the one or more optical components and at least one of

the one or more electrical components(page 635, section 2).

As to claim 3/2, wherein the step of computing the one or more performance

parameters of the fiber optic gyroscope through employment of the one or more

physical parameters of the at least one of the one or more optical components and

the at least one of the one or more electrical components comprises the steps of:

determining one or more relationships between the one or more performance

parameters and the one or more physical parameters(page 635, section 3.1-3.3);

and

employing one or more of the one or more relationships to compute the one or

more performance parameters(figure 3, page 635).

As to claim 4/3, wherein the step of employing the at least one of the one or

more relationships to compute the one or more performance parameters comprises

the steps of:

substituting one or more known values of the one or more physical

parameters into the one or more relationships(figure 3, page 635); and

employing the one or more known values of the one or more physical

parameters to compute the one or more performance parameters(figure 3; page 635,

section 3.1-3.3).

As to claim 5/3, further comprising the step of:

determining one or more desired values of the one or more physical

parameters for employment in causation of the one or more performance

parameters to equal or approach one or more provided performance parameter

values for the fiber optic gyroscope(figures 3-7; page 635, section 3.1-3.3).

As to claim 6/5, wherein the step of determining the one or more desired values of the one or more physical parameters for employment in causation of the one or more performance parameters to equal or approach the one or more provided performance parameter values for the fiber optic gyroscope comprises the step of:

employing the one or more desired values of the one or more physical parameters to design the fiber optic gyroscope to equal or approach the one or more provided performance parameter values(figures 3-7; page 635, section 3.1-3.3).

As to claim 7/3, wherein the step of employing the at least one of the one or more relationships to compute the one or more performance parameters comprises the step of:

employing the at least one of the one or more relationships and one or more initial values of the one or more physical parameters to compute the one or more performance parameters(figures 3-7; page 635, section 3.1-3.3).

As to claim 8/7, wherein the step of employing the one or more of the at least one relationships and the one or more initial values of the one or more physical parameters to compute the one or more performance parameters comprises the steps of:

determining a difference between the one or more performance parameters and one or more provided parameter values for the fiber optic gyroscope(figures 4-7, page 636);

iteratively adjusting at least one of the one or more initial values of at least

one of the one or more physical parameters through employment of the at least one

of the one or more relationships(figures 4 and 5, page 636); and

iteratively computing the one or more performance parameters through

employment of the at least one relationships and the at least one of the one or more

initial values(figures 4 and 5, page 636).

As to claim 9/2, wherein the one or more physical parameters comprise one or

more of:

an optical power of a light beam in a representation of a first phase

modulator(K) in a representation of a feedforward component of the closed-loop

transfer function of the fiber optic gyroscope(fig. 2);

an operating phase bias applied to one or more counter-propagating light

beams in the representation of the first phase modulator in the representation of

the feedforward component of the closed-loop transfer function of the fiber optic

gyroscope(K);

a photodetector scale factor in a representation of a photodetector in a

representation of a signal digitizer in the representation of the feedforward

component of the closed-loop transfer function of the fiber optic gyroscope(G);

a preamplifier impedance in a representation of a preamplifier in the

representation of the signal digitizer in the representation of the feedforward

component of the closed-loop transfer function of the fiber optic gyroscope(G);

a preamplifier gain of the preamplifier in the representation of the signal

digitizer in the representation of the feedforward component of the closed-loop

transfer function of the fiber optic gyroscope(G);

a gain in voltage in a representation of a filter after the photodetector and the

preamplifier and before an analog-to-digital converter in the representation of the

signal digitizer in the representation of the feedforward component of the closed-

loop transfer function of the fiber optic gyroscope(G);

a gain in a representation of the analog-to-digital converter of the

representation of the signal digitizer in the representation of the feedforward

component of the closed-loop transfer function of the fiber optic gyroscope(G);

a digital truncation gain in a representation of a truncator in a

representation of a demodulator in a representation of a feedback component of the

fiber optic gyroscope(G);

a transit time for the light beam to propagate through a representation of an

optical waveguide in the representation of the feedback component of the closed-

loop loop transfer function of the fiber optic gyroscope(the transit time $\tau = nL/c$

which is contained in $2\pi Ln/c$); and

a phase modulator scale factor in a representation of a second phase

modulator in the representation of the feedback component of the closed-loop

transfer function of the fiber optic gyroscope(K).

As to claim 10/1, wherein the closed-loop transfer function comprises:

a summing point(figure 2) that receives:

an input based on a rate of rotation of an optical waveguide of a

feedback component and a scale factor based on a wavelength of light

propagating through the optical waveguide, an optical path length of the

optical waveguide($2\pi LD/\lambda c$), and

a diameter of the optical waveguide(D), as a positive input; and

an input based on a modulated first light beam and a modulated

second light beam exiting the optical waveguide of the feedback component as

a negative input($2\pi Ln/c$);

wherein the summing point employs the positive input and the negative

input to determine a difference between the positive input and the negative input;

a feedforward component that receives the difference between the positive

input and the negative input as an input(K);

wherein the feedforward component employs the difference between the

positive input and the negative input to provide a signal proportional to a phase

difference between the modulated first light beam and the modulated second light

beam exiting the optical waveguide of the feedback component as an output(figure

2, section 2); and

wherein the feedback component receives the signal proportional to the phase

difference between the modulated first light beam and the modulated second light

beam exiting the optical waveguide of the feedback component as an input(figure 2,

section 2); and

wherein the feedback component employs the signal proportional to the

phase difference between the modulated first light beam and the modulated second

light beam exiting the optical waveguide of the feedback component to produce a

feedback signal(figure 2, section 2); and

wherein the feedback component employs the feedback signal to produce the

modulate first light beam and the modulated second light beam exiting the optical

waveguide of the feedback component(figure 2, section 2).

With regard to claim 11, Noureldin et al teach an article, comprising:

one or more storage media readable by a processor(computer simulation; page

633, abstract);

means in the one or more storage media for computing, via digital signal

processing, one or more performance parameters of a fiber optic gyroscope(figure 2)

to determine a relationship between a performance parameter and a physical

parameter associated with fiber optic gyroscope components through employment of

a closed-loop transfer function based at least one characteristic of:

one or more optical components of the fiber optic gyroscope(figure 2, section

2); and

one or more electrical components of the fiber optic gyroscope(figure 2, section

2).

As to claim 12/11, wherein the means in the one or more storage media for computing, via digital signal processing, the one or more performance parameters of the fiber optic gyroscope to determine a relationship between a performance parameter and a physical parameter associated with fiber optic gyroscope components through employment of the closed-loop transfer function based on the at least one characteristic of the one or more optical components of the fiber optic gyroscope and the one or more electrical components of the fiber optic gyroscope comprises:

means in the one or more storage media for determining one or more relationships(figure 3, page 635) between one or more physical parameters and one or more performance parameters of:

at least one of the one or more optical components(figure 2, section 2); and

at least one of the one or more electrical components(figure 2, section 2); and

means in the one or more storage media for employing at least one of the one or more relationships to determine the one or more performance parameters(figure 2, section 3).

As to claim 14/12, wherein the one or more performance parameters comprise one or more of a bandwidth of the fiber optic gyroscope, a coefficient of random walk of the fiber optic gyroscope, an operating frequency of the fiber optic gyroscope, and

a power spectral density of noise of the fiber optic gyroscope(figures 3-7; page 635,

section 3.1-3.3).

As to claim 15/14, wherein the coefficient of random walk of the fiber optic

gyroscope is computed as a function of optical power noise, shot noise, analog-to-

digital converter quantization noise, preamplifier thermal noise, preamplifier

current noise, preamplifier voltage noise, phase modulation, and gain(page 635,

section 3.2).

Response to Arguments

Applicant's arguments filed 12 February 2007 have been fully considered but

they are not persuasive.

With regard to the argument that Noureldin fails to teach "digital signal

processing", applicant points to figure 1 as prove that Noureldin discloses a FOG

with analog electronics. Claims 1-12, 14, and 15 are directed to computing

performance parameters of a FOG by digital signal processing, a computer

simulation. Figure 2, not figure 1, is directed to a computer simulation of the FOG

as a closed loop. The teachings of Noureldin in regard to figure 2 anticipates the

claimed invention.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of

time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire
THREE MONTHS from the mailing date of this action. In the event a first reply is
filed within TWO MONTHS of the mailing date of this final action and the advisory
action is not mailed until after the end of the THREE-MONTH shortened statutory

period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.
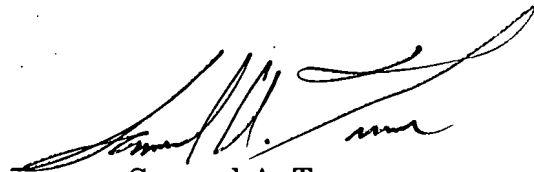
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A. Turner whose phone number is 571-272-2432.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached on 571-272-2800 ext. 77.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Samuel A. Turner
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